Working hours and alcohol problems in early adulthood

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Abstract

Aims: To examine the associations between working hours and alcohol-related problems during early adulthood.

Design and setting: Longitudinal study of a birth cohort born in Christchurch, New Zealand in 1977 and studied to age 30.

Participants: 1019 participants with data available for working hours and alcohol-related problems at either age 25 or 30.

Measurements: Weekly working hours in paid employment; frequent alcohol use; diagnosis of alcohol abuse/dependence; number of symptoms of alcohol abuse/dependence. Associations between working hours and alcohol-related problems were adjusted for covariates including measures of: parental and family background; personality and behaviour; IQ and educational achievement; recent negative life events; recent mental health problems; and current partner and family circumstances.

Findings. Longer work hours were significantly associated with more frequent alcohol use ($p<.0001$), higher rates of alcohol abuse/dependence ($p=.0001$), and a greater number of alcohol abuse/dependence symptoms ($p=.01$). These associations were adjusted for a wide range of confounding factors. After adjustment there remained significant ($p<.05$) associations between working hours and alcohol-related problems, with those working 50 or more hours per week having rates of alcohol-related problems 1.8 to 3.3 times higher than those who were not working. The associations between work hours and alcohol use were similar for males and females.

Conclusions. The results of this study suggest that longer work hours are associated with higher rates of alcohol-related problems, including more frequent alcohol use, higher

rates of alcohol abuse/dependence, and a greater number of alcohol abuse/dependence symptoms. These associations remain even after extensive adjustment for confounding.

Introduction

Participation in paid employment is associated with a range of mental health benefits including lower rates of depression and anxiety and better general wellbeing [1-4]. However, a possible exception to this trend is the association between employment and alcohol-related problems. Previous research has suggested that employment, rather than being associated with lower rates of alcohol-related problems, may be associated with higher rates of heavy drinking, alcohol abuse and alcohol dependence [5-7].

Most previous research in this area has focussed on adolescence. Studies have suggested that employed adolescents have higher rates of alcohol use and alcohol-related problems than adolescents who are not employed, and that these rates appear to be related to the number of hours worked, with adolescents who work long hours having higher rates of alcohol-related problems than those who work only a few hours a week [7-11]. It has been suggested that increased rates of drinking amongst employed adolescents are due to premature exposure to adult environments and behaviours which encourage precocious alcohol use [7, 8, 11, 12].

There has, however, been much less research on the association between employment and alcohol-related problems during adulthood, and the results of the few available studies are mixed. Some studies have reported that employed individuals have higher rates of alcohol-related problems than individuals who are not employed, and that this may be due to higher incomes amongst employed individuals [5, 6]. Studies have also reported that longer work hours are associated with higher rates of alcohol use and alcohol-related problems [13, 14]. For example, Trinkoff and Storr [13] reported that longer work shifts and overtime days were associated with increased alcohol use amongst

nurses. In contrast, other studies have failed to find associations between work hours and alcohol-related problems [15, 16]. For example, Steptoe et al [15] found that weekly work hours were not associated with alcohol intake amongst retail workers.

However, previous studies of the associations between employment and alcohol-related problems have several limitations. First, most previous studies have not adequately controlled for confounding. It is possible that the association between employment and alcohol-related problems can be explained by background or other factors that are associated with both employment and the development of alcohol-related problems. While few studies using adult samples have controlled for potential sources of confounding, studies using adolescent samples have suggested that controlling for confounding may reduce the association between working hours and substance use [9, 17]. Furthermore, most previous studies of employment and alcohol-related problems have tended to focus on only a single measure of alcohol-related problems, or have restricted their sample to participants from a particular occupation or company [13, 15, 16].

This study examines the associations between work hours and alcohol-related problems using data from a birth cohort of 30 year-old adults. The specific aims of the present study are:

i) To examine the associations between hours worked in paid employment and a range of alcohol-related problems;

ii) To adjust the associations between work hours and alcohol-related problems for confounding.

Methods

Data and participants

Data were drawn from the Christchurch Health and Development Study, a longitudinal study of a birth cohort of 1265 individuals born in Christchurch, New Zealand in 1977. Individuals were followed up at birth, 4 months, yearly to age 16, then at ages 18, 21, 25 and 30 using a combination of semi-structured interviews, standardised testing, and teacher reports [see 18, 19 for review of major study findings]. The remaining sample consisted of 1003 individuals at age 25 (81.3% of the surviving cohort) and 987 individuals at age 30 (80.2% of the surviving cohort).

Measures

Work hours

At ages 25 and 30, participants were asked to report the weekly hours worked in each of their current paid jobs or, if not currently employed, their most recent job within the last 12 months. If weekly hours varied, participants were asked to estimate an average. If participants worked in more than one job concurrently, weekly hours in all jobs were summed to give the total weekly hours worked. If participants were not employed at any time during the previous 12 months their weekly hours were defined as zero. Work hours were classified into four groups: 0 hours; 1-29 hours; 30-49 hours; and 50 or more hours. Overall, at age 24-25, 8.2% of participants worked 0 hours, 13.2% worked 1-29 hours, 61.9% worked 30-49 hours, and 16.7% worked 50 or more hours. At age 29-30, 9.1% worked 0 hours, 12.1% worked 1-29 hours, 60.7% worked 30-49 hours,

and 18.2% worked 50 or more hours. This distribution of working hours is similar to comparable age groups in other developed countries such as Australia [20].

Alcohol-related problems

Frequency of alcohol use

At ages 25 and 30, participants were asked how often they had drunk alcohol over the last 12 months and were classified into two groups based on whether or not they reported frequent ('almost every day' or more often) alcohol use (6.9% of participants at age 25 and 11.6% at age 30).

Diagnosis of alcohol abuse/dependence

At ages 25 and 30, participants completed a comprehensive mental health interview based around the Composite International Diagnostic Interview [21]. Interview data were used to construct a series of psychiatric disorder diagnoses for the 12-month period prior to the interview according to DSM-IV criteria [22]. Participants who met criteria for either alcohol abuse or alcohol dependence over the 12-month period were classified as having a diagnosis of alcohol abuse/dependence (13.6% of participants at age 24-25 and 9.0% at age 29-30).

Number of alcohol abuse/dependence symptoms

As part of the mental health interview participants were questioned about whether they had experienced a range of symptoms of alcohol abuse and dependence over the previous 12 months. Participants were classified into four groups based on the total number of alcohol abuse and alcohol dependence symptoms experienced: 0; 1; 2; or 3 or more. At age 25, 81.0% of participants had no symptoms, 8.4% had one, 4.6 had two, and

6.1% had three or more. At age 30, 86.6% of participants had no symptoms, 7.1% had one, 2.7% had two, and 3.6% had three or more.

Covariates

To control for confounding, associations between work hours and alcohol-related problems were adjusted for covariate factors spanning a wide range of measures taken during childhood or adolescence (parental and family background; childhood abuse; personality, behaviour and individual factors; gender; and IQ and academic ability) and measures taken concurrently with the hours worked and alcohol problem measures at ages 25 and 30 (partner and family situation, education, recent negative life events, income, occupational status). Covariates that were significant in at least one model are described below.

Gender

Gender was the participant's sex reported at the birth interview. At age 25, 48.7% of the sample was male, and at age 30, 48.4% was male.

Novelty seeking

Novelty seeking was assessed using the Tridimensional Personality Questionnaire [23] administered when participants were aged 16 years (reliability: α=.76).

Neuroticism

At age 14, participants completed the short form version of the neuroticism scale of the Eysenck Personality Inventory [24] (reliability: α=.80).

Deviant peer affiliations

This measure represented the extent to which participants reported at age 15 that their friends were involved in deviant behaviours including nicotine, alcohol and

illicit drug use, violent and property offending, and truancy and suspension from school [25].

Childhood adversity

This variable was a count measure of 39 measures of family disadvantage from age 0-15, including measures of disadvantaged parental background, poor prenatal health practices and perinatal outcomes, and disadvantageous child-rearing practices [26].

Current cohabiting partner

At age 25 and 30, participants were asked if they were currently involved in a cohabiting partner relationship. Overall 47.6% of participants were in a cohabiting relationship at age 25 and 66.0% at age 30.

Negative life events in previous 12 months

At age 25 and age 30 participants were asked whether or not they had experienced a range of negative life events (relationship breakup, serious illness/accident, serious family problem, death of a friend/family member, been a victim of crime) in the 12 months preceding the interview. These measures were summed to give the total number of negative life events experienced in the past 12 months. This measure ranged from 0 to 5 and had a mean of 0.8.

Parent to dependent children

At age 25 and 30, participants were asked whether they currently had any dependent children (biological or step-children) who lived with them full-time. Overall 17.0% of participants had dependent children at age 25 and 35.7% at age 30.

Number of mental health problems since last interview

Data from the comprehensive mental health interviews conducted at ages 25 and 30 (see above) were used to construct diagnoses according to DSM-IV [22] criteria for: major depression; anxiety disorder (generalised anxiety disorder, panic disorder, social phobia, specific phobia, or agoraphobia); and illicit drug abuse/dependence (including cannabis). These measures were summed to give the total number of mental health diagnoses over the period since the last interview. At age 25, 61.7% of participants had no diagnoses, 25.7% had one, 10.2% had two, and 2.4% had three. At age 30, 65.9% of participants had no diagnoses, 22.9% had one, 10.0% had two, and 1.2% had three.

Statistical analysis

Associations between the repeated measures of work hours and alcohol-related problems were tested for statistical significance by fitting regression models to the data for each alcohol problem measure using a generalised estimating equation (GEE) approach [27, 28]. The GEE approach pooled the repeated measures on the hours worked measure and on each alcohol problem measure at ages 24-25 and 29-30 years to produce an estimate of the population averaged association between hours worked and the alcohol-related problem. For dichotomous outcomes (frequent alcohol use and diagnosis of alcohol abuse/dependence) a logistic regression model was fitted of the form:

$$\text{logit}(Y_{it}) = B_0 + B_1X_{it}$$

where $\text{logit}(Y_{it})$ was the log odds of the outcome Y for participant i in time period t (t = 24-25, 29-30) and X_{it} was weekly hours worked for individual i in time period t. For the

count measure (symptoms of alcohol abuse/dependence) a Poisson regression model was fitted of the form:

$$\log(Y_{it}) = B_0 + B_1X_{it}$$

where $\log(Y_{it})$ was the logarithm of the rate of symptoms for the *i*th individual in the *t*th time interval. In all cases the fitted models permitted the repeated measures of the outcomes to be correlated.

In these models the coefficient B_1 represents the effect of work hours on the outcome. To examine the adequacy of the linearity assumption for the effect of hours worked, the fitted models were extended by incorporating additional design variates representing categories of work hours to test for departures from linearity. Effect sizes (odds ratios and incident rate ratios) were calculated using the formula e^{B1} where *e* is the base of natural logarithms and B1 is the regression coefficient for hours worked.

To adjust the observed associations between work hours and the alcohol-related problem measures for confounding factors, the GEE models above were extended to include a series of covariate factors (see above). All covariate factors were initially included, and then the model was successively refined to remove those that were not significant ($p<.05$) predictors. For dichotomous outcomes the model fitted was of the form:

$$\text{logit}(Y_{it}) = B_0 + B_1X_{it} + \sum B_jZ_{ij} + \sum B_kZ_{ikt}$$

and for the count measure the model fitted was of the form:

$$\log(Y_{it}) = B_0 + B_1X_{it} + \sum B_jZ_{ij} + \sum B_kZ_{ikt}$$

where Z_{ij} were a set of fixed covariates and Z_{ikt} a set of time dynamic covariate factors for individual i. In these models the coefficient B_1 represents the effect of hours

worked on the alcohol-related problem measure net of the correlated effects of the other covariates.

Finally, to test the equivalence of the effect of hours worked on each outcome for males and females the final fitted regression models were extended so that the effect of hours worked was nested within gender. The equality of the coefficients B_1 for males and females was then tested using a Wald chi squared test. Adjusted proportions were calculated using the methods described by Lee [29]. All statistical analyses were conducted in SAS 9.1 for Windows.

Sample size and sample bias

Over the course of the study there has been a gradual loss of participants due to participant death, refusal, and inability to trace participants. At age 30, the cohort consisted of 987 individuals representing 80% of the surviving original cohort. The current analyses were based on a sample of 1019 individuals for whom data were available on measures of employment and alcohol use at either age 25 or age 30.

The gradual loss of the sample over time raises questions about the extent to which the current findings may be affected by sample bias due to non-random sample loss. To examine this, missing data were imputed and the results re-analysed using the PROC MI and PROC MIANALYZE procedures in SAS 9.1 which use multiple imputation [30-32] to impute missing outcomes and then use these outcomes in the analysis to adjust standard error estimates under the assumption that there was no bias in the estimation of the outcomes. The results of the re-analysis using the imputed data were not substantively different from those using the original data and, in all cases, led to the same conclusions, suggesting that the results were not significantly affected by sample

bias due to sample loss. Therefore, the remainder of this paper presents only the results obtained using the original (reduced) sample.

Results

Table 1 shows the associations between the weekly work hours and a range of measures of problem alcohol use (frequent alcohol use, symptoms of alcohol abuse/dependence, diagnosis of alcohol abuse/dependence). Associations are reported at age 25 and age 30, and also pooled across the two ages. For each measure, the table shows the significance level for tests of linear association between hours worked and each of the alcohol outcomes. The associations were also tested for the presence of non-linear trends (see Methods). In all cases no significant non-linear trend was found (all $p>.05$). The table also shows effect size estimates for rates of alcohol problems for varying levels of work hours compared to the rate for those who were not employed. For frequent alcohol use and diagnosis of alcohol abuse/dependence the estimates are odds ratios, for the symptoms of alcohol abuse/dependence measure the estimate is the incident rate ratio.

The table shows that, at both ages, longer working hours were associated with higher rates of alcohol-related problems, with rates tending to show a steady increase with increasing hours worked. Those working 50 or more hours per week had rates of alcohol-related problems that were 1.9 to 4.3 times higher than those who were not employed.

In all cases, associations between hours worked and alcohol-related problems were significant ($p<.05$). Hours worked was significantly associated with more frequent alcohol use ($p=.002$), higher rates of alcohol abuse/dependence ($p=.0001$) and a greater number of alcohol abuse/dependence symptoms ($p=.01$). These associations were apparent at ages 25 and 30, and in the pooled data.

TABLE 1 HERE

Associations between hours worked and confounding factors

Table 2 reports the associations between hours worked and a range of potential confounding factors. For the purposes of the table, most measures have been dichotomised. The table reveals that longer work hours were significantly ($p<.05$) associated with:

i) More advantaged family and adolescent background, including lower levels of childhood adversity ($p<.0001$), and lower levels of adolescent deviant peer affiliations ($p=.0005$).
ii) Individual and personality factors, including lower neuroticism ($p=.02$), higher total IQ ($p<.0001$), and male gender ($p<.0001$).
iii) Higher total personal and family incomes in the past 12 months (both $p<.0001$).
iv) Current life circumstances, including having a university degree ($p<.0001$) and being the parent of dependent children ($p<.0001$).
v) Lower rates of recent mental health problems ($p<.0001$).

TABLE 2 HERE

Adjustment for confounding

To examine whether the associations between working hours and alcohol-related problems could be explained by confounding, the associations in Table 1 were adjusted for the factors listed in Table 2 (see Methods).

Table 3 shows the adjusted associations between working hours and alcohol-related problems. For each measure, the table shows the adjusted mean or proportion scores, and the p-value from the repeated measures model that pools across ages 25 and 30. The significant covariate factors from the regression model are also listed.

The table shows that, after adjustment for confounding factors, longer working hours continued to be associated with higher rates of alcohol-related problems. Individuals working 50 or more hours per week had rates of alcohol-related problems that were 1.8 to 3.3 times higher than those for individuals who were not employed. In all cases, the adjusted associations were statistically significant ($p<.05$).

TABLE 3 HERE

Gender differences

To examine whether the association between work hours and problem alcohol use varied with gender, the final models from Table 3 were extended so that the work hours variable was nested within gender (see Methods). Regression coefficients for the work hours variable for males and females were compared using a Wald chi squared test. In all cases there were no significant gender differences (all $p>.05$), suggesting that the associations between working hours and alcohol-related problems are similar for males and females.

Discussion

This paper examined the associations between the number of weekly hours spent in paid employment and alcohol-related problems in a birth cohort of individuals studied to age 30. Longer working hours were significantly associated with higher rates of alcohol-related problems, including more frequent alcohol use, higher rates of alcohol abuse/dependence, and a greater number of alcohol abuse/dependence symptoms. These associations remained even after extensive control for confounding factors including income and occupational status. After adjustment for confounding, those who worked 50 or more hours per week had rates of alcohol-related problems that were 1.8 to 3.3 times higher than those who were not employed. The associations between working hours and alcohol-related problems were similar for males and females.

These findings are consistent with previous research which has suggested that long working hours are associated with increased rates of alcohol-related problems [5, 6, 13, 14]. The findings from the current study suggest that this association persists even after extensive adjustment for confounding. It also extends the findings of previous studies that have reported that long working hours during adolescence are associated with higher rates of alcohol use [8, 9, 11], and suggests that this association continues into adulthood. While the association between working hours and alcohol use during adolescence is usually explained by working adolescents having premature exposure to an adult environment, the findings from the current study suggest that there could be several other explanations for the association. First it could be suggested that the associations reflect factors such as income or occupational status that are associated with

longer working hours. This explanation is not supported by the present study since the association between hours worked and alcohol-related problems remained even after control for these and other confounding factors (see Table 3).

Second it may be suggested that the finding indicates a cause and effect association between hours worked and rates of alcohol-related problems. Such an association could arise in a number of ways:

i) Increased alcohol use may be an attempt to alleviate the increased stresses associated with longer working hours. This explanation is consistent with previous research showing that longer work hours are associated with increased stress [33, 34] and that higher stress levels are associated with greater alcohol use [35].

ii) The associations between work hours and alcohol-related problems may be mediated by social contact in the workplace. Individuals who work longer hours may have more social contact with co-workers, and workplaces where long hours are commonplace may experience a more sociable atmosphere that involves a greater level of alcohol use.

Finally it could be suggested that the association between work hours and problem alcohol use can be explained by confounding factors that were not controlled in the analysis. While efforts were made to control for a wide range of confounding factors, it remains possible that there may be additional factors that may explain the associations.

Strengths and limitations

A strength of the current study is the rich longitudinal data set used which allowed for extensive control for a wide range of potential confounding factors. The findings from

the study provide new information about the impact of long working hours on alcohol-related problems during young adulthood.

However, a limitation of this study is that it used a birth cohort of individuals born in the same time and the same place. It is not clear to what extent the results of the current study would generalise to individuals in other countries or of different ages.

This limitation notwithstanding, the results of this study indicate that, even after extensive allowance for confounding, longer working hours are associated with higher frequency alcohol use, and higher rates of abuse and dependence. This may suggest a need for consideration of policies and programmes targeted at individuals who work long hours, with the aim of reducing rates of alcohol-related problems.

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Table 1. Associations between weekly work hours and alcohol-related problems, ages 25 and 30

	Hours worked per week				
N (age 25, 30)	0 (82, 90)	1-29 (132, 119)	30-49 (620, 598)	50+ (167, 179)	p
Frequent alcohol use ("most days") (%)					
Age 25	3.7	1.5	7.3	11.4	.002
Age 30	4.4	5.9	12.2	16.8	.0004
Pooled	4.1	3.6	9.7	14.2	<.0001
OR (Pooled)	1.0	1.6	2.6	4.3	
Mean number of alcohol abuse/dependence symptoms					
Age 25	.35	.33	.40	.57	.001
Age 30	.20	.18	.26	.36	.03
Pooled	.27	.26	.33	.47	.01
OR (Pooled)	1.0	1.2	1.5	1.9	
Diagnosis of alcohol abuse/dependence (%)					
Age 25	8.5	10.6	12.9	21.0	.004
Age 30	3.3	7.6	8.5	14.0	.004
Pooled	5.8	9.2	10.8	17.3	.0001
IRR (Pooled)	1.0	1.5	2.2	3.3	

OR = odds ratio; IRR = incident rate ratio.

Table 2. Associations between work hours and potential covariate factors

	Hours worked per week				
Covariate factors	0	1-29	30-49	50+	p
Gender (% male)	23.3	23.5	51.0	70.2	<.0001
Highest decile of childhood adversity age 0-10 (%)	23.8	15.8	6.6	5.6	<.0001
Highest decile of neuroticism age 14 (%)	11.7	12.5	7.2	7.4	.02
Highest decile of novelty seeking age 16 (%)	12.8	12.4	10.8	11.0	.79
Highest decile of deviant peer affiliations age 16 (%)	10.7	15.0	6.7	8.8	.0005
Total IQ age 8/9 (mean)	96.2	101.9	104.7	105.2	<.0001
Total personal income last year (mean, $NZ)	12289	18281	44340	53073	<.0001
Total family income last year (mean, $NZ)	34413	41320	68588	76804	<.0001
Attained university degree (%)	10.5	21.1	32.4	24.9	<.0001
Cohabiting partner (%)	52.9	52.2	57.1	60.7	.14
Parent of dependent children (%)	60.5	53.0	18.0	19.1	<.0001
Number of negative life events in past 12 months (mean)	0.8	1.0	0.7	0.9	.50
Mean number of mental health problems since last interview	0.8	0.7	0.4	0.4	<.0001

Table 3. Adjusted associations between work hours and alcohol-related problems

	Hours worked per week					Significant covariates
Alcohol-related problem measures	0	1-29	30-49	50+	p	
Frequent alcohol use (“most days”) (%)	4.6	6.5	9.1	12.7	.002	1, 3, 5, 9
OR	1.0	1.5	2.1	3.1		
Mean number of alcohol abuse/dependence symptoms	.20	.24	.30	.36	.02	1, 3, 6-8
OR	1.0	1.2	1.5	1.8		
Diagnosis of alcohol abuse/dependence (%)	5.8	8.3	11.8	16.3	.0002	1-4, 6, 7
IRR	1.0	1.5	2.2	3.3		

OR = Odds ratio; IRR =Incident rate ratio.

Significant covariates: 1=gender; 2= deviant peer affiliations age 16; 3=novelty seeking age 16; 4=neuroticism age 14; 5=childhood adversity age 0-10; 6=current cohabiting partner; 7=number of mental health problems since last interview; 8=number of negative life events in last 12 months; 9=parent of dependent children